NASA Procedural Requirements

NPR 2570.1
Effective Date: April 24, 2003
Expiration Date: April 24, 2008

COMPLIANCE IS MANDATORY

Printable Format (PDF)

Subject: NASA Radio Frequency (RF) Spectrum Management Manual

Responsible Office: Space Operations Mission Directorate

Chapter 4: Radio Frequency Interference Procedures

4.1 Radio Frequency Interference Reporting Procedures

4.1.1 The probability of harmful RFI increases as more and more demands for frequency assignments are placed in the RF spectrum. In an attempt to meet these demands and to optimize the use of the spectrum, the space between channels is minimized within the limitations imposed by the state-of-the-art development of electronic equipment. The same frequencies are often shared by users separated geographically, or the same frequencies may be assigned to two or more users on a time-share basis. Because of this, some interference can be expected (and even tolerated) since, ordinarily, clear channels are not available within the overcrowded RF spectrum.

4.1.2 Occurrences of interference are to be investigated initially at the lowest possible echelon of NASA spectrum management. Reports of harmful interference or jamming of NASA emitters should be distributed as follows:

a. At the impacted Center:

(1) Office of Safety and Mission Assurance

(2) Occupational Health Office

(3) Local Security Office

b. At NASA Headquarters:

(1) Office of Security Management and Safeguards (Code X)

(2) Office of Inspector General (Code W)

4.1.3 Consideration should also be given to including intentional interference as an information technology security incident, which needs to be reported to the NASA Incident Response Center (NASIRC) and the OIG Computer Crimes unit. Requests for the assignment of replacement frequencies will be made only if the interference is prolonged and disruptive and cannot be cleared through normal procedures.

4.2 RFI Control Procedures

4.2.1 Radio Frequency Users

4.2.1.1 Normally, the NASA frequency user will be the first to become aware of RFI, and a judgment must be made of how the observed RFI affects their operation.

4.2.1.2 If the interference is such that it cannot be tolerated, proceed in the following manner:

Step 1: Thoroughly check the affected equipment to ensure that the equipment is operating properly and the RFI is not being generated internally or on the site.

Step 2: If possible, identify by call sign (or other identification) the station causing the interference.

Step 3: Measure the frequency or band of frequencies causing the interference.

Step 4: If possible, determine the type of emission and the type of traffic being transmitted.

Step 5: If possible, measure the bandwidth of the interfering signal (highest and lowest frequencies) and note the type of equipment used for measurement.

Step 6: Measure the interference signal strength.

Step 7: Determine the nature or severity of the interference. Indicate the impact to operations including the severity of data loss or data degradation due to the interference.

Step 8: After the information in Steps 2 through 7 have been obtained, report this data to the Center Spectrum Manager together with a formal request to clear the interference.

Step 9: Supply the Center Spectrum Manager with any additional information that is necessary or may be useful in identifying and clearing the RFI (e.g., tape recordings or spectrum photographs).

4.2.2 Center Spectrum Managers

4.2.2.1 The Center Spectrum Manager will make every effort to clear the interference at the Center before requesting assistance from the National Spectrum Program Manager.

4.2.2.2 Follow the appropriate procedures listed below to clear cases of interference to Agency operations:

Step 1: Check the information supplied by the frequency user to ensure that it is as complete as possible. Request additional information from the user as required for filing the standard RFI report (See Step 6).

Step 2: If the station can be identified, contact the interfering station directly, and attempt to clear the interference through coordination with the station manager. If the interference originates from a foreign (non-U.S.) source, contact the National Spectrum Program Manager for further assistance (see paragraph 4.2 e (2) and (3)).

Step 3: If direct contact with the interfering station is unsuccessful and the interference appears to be from a non-Government station, request assistance from the nearest FCC monitoring station as required, to coordinate efforts to clear the interference.

Step 4: If the interference is encountered on or from a DOD Test Range, report the RFI to the Area Frequency Coordinator (see Table 3-1) in accordance with appropriate range communications instructions.

Step 5: If all attempts to clear the interference through local coordination fail, report the RFI to the National Spectrum Program Manager in accordance with Steps 6 and 7 below.

Step 6: Forward a message directly to the National Spectrum Program Manager. Use the standard RFI reporting format shown in Figure 4-1 for listing the particulars of the interference.

Figure 4-1 Standard RFI Reporting Format

Report of Harmful Interference

Particulars Concerning the Station Causing the Interference:

A. Name or call sign and category of state.....

B. Frequency measured.....

C. Class of emission.....

D. Bandwidth.....

E. Field strength.....

F. Nature of interference.....

Particulars Concerning the Transmitting Station Interfered with:

G. Name or call sign and category of station.....

H. Frequency assigned.....

I. Frequency measured.....

J. Class of emission.....

K. Bandwidth.....

L. Field strength.....

Particulars Furnished by the Receiving Station Experiencing the Interference:

M. Name of station.....

N. Geographic location of station.....

O. Dates and times of occurrence of harmful interference.....

P. Other particulars.....

Q. Requested action.....

Note: For convenience and brevity, prepare reports in the format above, using the letters in the order listed in place of the explanatory titles, and place an "X" after any such letter if no information on that particular item is reported.

Step 7: When practicable, forward a followup letter to the National Spectrum Program Manager. Reference the message by number, date, and time, and include the same information as the message together with a detailed report of local action taken to eliminate the interference.

4.2.2.3 The Center Spectrum Manager should cooperate fully with non-NASA spectrum users in resolving RFI that may be caused by emissions from within the local Center.

4.2.3 National Spectrum Program Manager

4.2.3.1 When an RFI problem cannot be resolved at the Center, the National Spectrum Program Manager must attempt to clear the interference through direct coordination with other Agencies, if the problem is a national one, or indirectly with the assistance of the FCC or the NTIA, if the problem is either international or the result of a non-Government system.

4.2.3.2 Follow the steps below as they apply to the particular situation:

Step 1: If the RFI is caused by a non-Government station operating in the United States and its Possessions, notify the FCC directly, and provide such information and assistance required to enable the FCC to clear the interference.

Step 2: If the RFI is caused by a station operated by another agency or department of the U.S. Government, refer the matter to the Interdepartment Radio Advisory Committee (IRAC), including a full report of the interference and a request for action or assistance, as required.

Step 3: If the RFI is caused by a station of another nation operating outside the United States and its Possessions, refer the matter to IRAC or to NTIA as appropriate. NTIA or the FCC will assume the coordination necessary to resolve the problem at the International level through the ITU, if required.

4.2.3.3 The National Spectrum Program Manager should cooperate fully with non-NASA spectrum users in resolving RFI that may be caused by emissions from within the local Center.

4.2.4 STS RFI Management

Procedures for RFI Management for the Space Transportation System (STS) are defined in NASA Publication 530-RFIMM/Space Shuttle, dated April 1994, and titled Space Shuttle Program Radio Frequency Interference Management Manual.[1]

4.2.5 Interference From Foreign (Non-U.S.) Sources

4.2.5.1 All other NASA flight projects shall follow the procedures for the management of RFI situations, outlined earlier in this paragraph, except when the interference is believed to originate from a foreign (non-U.S.) source.

4.2.5.2 In the case of interference from a foreign (non-U.S.) source, the National Spectrum Program Manager shall use the information supplied in the standard RFI report to apprise appropriate spectrum administration offices (e.g., NTIA, FCC, U.S. Department of State) of the interference, its nature, source, and the need for cessation.

4.2.5.3 In the case where interference from a foreign (non-U.S.) source is jeopardizing the return of unique scientific data or the survival of a spacecraft (e.g., spacecraft emergency), the Agency Spectrum Program Manager shall contact appropriate Space Frequency Coordination Group (SFCG) members to try to secure cessation of the interfering transmission. This action is to be followed up with a formal report to the appropriate spectrum administration office (e.g., NTIA, FCC or U.S. Department of State).

4.2.6 NASA/ESA/NASDA RFI Coordination Procedures

Coordination of spectrum use between NASA, the European Space Agency (ESA) and the National Space Development Agency of Japan (NASDA) shall conform to the procedures outlined in the appropriate coordination

manual.

4.2.7 Space Frequency Coordination Group (SFCG)

4.2.7.1 The SFCG was established to provide a less formal and more flexible environment, as compared with the formal structure of the International Telecommunication Union (ITU), for the solution of frequency management problems encountered by member space agencies. The Terms of Reference for SFCG are given in Appendix I.

4.2.7.2 The SFCG is concerned with the effective use and management of those radio frequency bands as allocated in the ITU RR for radio services within the scope of Radiocommunication Sector Study Group 7. In particular, the services of interest to the SFCG include space research, Earth-exploration satellites, meteorological satellites, space operations, data relay satellites, and radio astronomy (including radar astronomy) to the extent that they are relevant to spacecraft missions. Within the formal framework of the Radio Regulations, there is the need and opportunity for international informal agreement among participating space agencies concerning assignment of specific frequencies and related technical issues.

4.2.7.3 The principal result of SFCG meetings is the adoption of resolutions and recommendations that express technical and administrative agreements. These agreements may be used by space agencies to make best use of allocated bands and to avoid interference.

4.2.8 ISS Radio Frequency Coordination

Procedures for radio frequency coordination for the International Space Station (ISS) are defined in NASA publication SSP 50423, ISS Radio Frequency Coordination Manual.

[1] This document is available on the GSFC Web site: http://csoc-ddcs.csoconline.com/library/project/sshuttle.asp .

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